

GYPSES ATTACK FOREST – OR IS IT ACID RAIN?

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Driving through the semi-natural forest, or *garrigue* of southern France in June 1988 I was astonished to find huge tracts of land apparently suffering from a very severe attack of acid rain. This seemed mysterious since the Languedoc is not noted as being a recipient of pollutants from the east or north, even if the Mistral, and the other 50 named winds are blowing. But yet, hectare upon hectare was completely defoliated.

The area observed was from Ganges (Gard) to the outskirts of Montpellier (Hérault), a distance of 35 km (22 miles) and was at least 9 km (5 miles) wide. Much of this land is rugged and wild and I was not able to ascertain whether the damage was more extensive than I saw. The effects of acid rain, I thought, had suddenly come to the Languedoc, and taken us all by surprise. After all, some suspected effects of acid rain have been recorded not far away on Mt Aigoual.

However, on closer inspection the culprits were found to be larvae. The trees were covered from top to bottom with larvae, fine webbing, yellow egg masses on the trunks and limbs, and pupae dangling in groups, or singly, festooning the leafless trees by the thousand, as if deliberately decorated as Christmas trees. There were large pupae and little ones, which would turn out to be respectively the large-abdomened females and the smaller males. They were, of course, all of the gypsy moth (*Lymantria dispar*) a perennial scourge along the seminatural forests of the Mediterranean.

The gypsy moth larvae were effectively defoliating quite a number of tree species, but they clearly had their likes and dislikes. They were not completely catholic in their choice. The dominant trees of the area are the evergreen or holm oak (*Quercus ilex*) and these had been thoroughly defoliated, creating an eerie landscape. It looked like a deciduous woodland in winter but it was summer, and the trees were meant to be evergreen!

Other trees defoliated included the deciduous white or downy oak (*Quercus pubescens*), elm (*Ulmus* sp.), wild pear (*Pyrus pyraeaster*) and Mediterranean buckthorn (*Rhamnus alaternus*). Surprisingly the hairy larvae had defoliated the turpentine tree (*Pistacia terebinthus*), and were apparently immune to its turpentine oils. Possibly they were sequestering the oils for their own defensive advantage. The turpentine tree is a typical species of the south, and breaking any leaf, fruit or stem, releases aromatic and disagreeable odours.

In this wilderness of apparently dead oaks, there were other trees and shrubs left completely untouched, presumably those unpalatable or which the larvae could not exploit, perhaps thwarted by their toxins. These included common box (*Buxus sempervirens*) — which contains alkaloids, white mulberry (*Morus alba*) and strawberry tree (*Arbutus unedo*). Spurge, especially the metre-high *Euphorbia characias* which contains milky white alkaloids were also left completely untouched.

Larvae were everywhere, swarms of them, not just in the woods. Roads were gathering a veritable paté of larvae as they wandered in ceaseless numbers from the countryside. I suspect that the larvae were also eating the tall 'London' planes (*Platanus × hybrida*) (though not completely defoliating them), since in village squares the caterpillars were swarming over tree trunks, dusty paths and seeking refuge on walls, under arches, doors and windows, anywhere to lie up, spinning

flimsy transparent covers in which to pupate. Old men were out with broom handles, killing all larvae on sight, especially around door frames. One man told me of the perennial menace of these annoying insects — every 3 or 5 years.

With such a concentration of larvae, ideal opportunities exist for parasites and hyperparasites. A selection of mature larvae brought back to England resulted in a number of parasitic Hymenoptera and Diptera. These were kindly analysed by Dr Mark Shaw of the Royal Museum of Scotland. One very large ichneumonid turned out to be *Theronia atalantae* (Poda) — a male. This species is incredibly rare, if not extinct in Britain. However, it is commoner in Europe, but still scarce. Of interest was the presence of a large chalcid, a male *Brachymeria intermedia* (Nees) which was obviously making its own successful depredations on *dispar* pupae in the wild. In America this same species has been used to control *L. dispar*. There were various tachinids present too.

Seeing the 100% defoliation on the holm oaks, one assumes that it might be fatal to the trees. However, by August the trees had flushed out another set of leaves, albeit, not a thorough covering but enough to photosynthesize and survive. If the gypsy moth occurs like this two or three times every decade, there is no evidence that the trees are dying from repeated defoliation. They seem to be as healthy as ever. The holm oak, in any case, is a thoroughly drought-tolerant species and has, therefore, adaptations to restricted growth in its physiology.

The effectiveness of the larvae to colonize new blocks of semi-natural forest is perhaps aided by their powers of dispersal, for gypsy moth larvae have been sampled at 600 m when upper levels of the air have been trawled. There are other features which help to make the gypsy moth a very successful insect. Adult females attract mates on emergence using their powerful pheromones. The gregariousness of the larvae makes up for the adults which do not have mouthparts and cannot feed. Mating and egg-laying done, the perfunctory role of the adults is completed. In captivity adults do not fly but sit around, sometimes vibrating their wings, like a *Bombyx* silkmoth, but going nowhere.

Defoliating larvae of various species have always been a nuisance in the South of France. The Michelin guide to the Côte d'Azur (1985) describes a problem with larvae in the 16th century at the Roman village of Contes (north of Nice, Alpes-Maritimes). This prealpine village was so overrun with larvae (species undisclosed) that the tribunal issued an order banning them to exile. Apparently the larvae obeyed and never returned. Staying in the village last year, I imagined that it may have been the work of the pine processionary moth, *Thaumetopoea pityocampa* since there are still many native pines in the region (Aleppo, stone and maritime). Professor H. Harant (1983) is a little more helpful in that it was apparently the Bishop of Nice who damned the larvae to hell in 1508. He also mentions that plagues of grasshoppers were legislated against by the Parliament of Aix in 1545 and 1596.

On a similar note on the rapaciousness of insects Lady Hanbury (1938) recounted a legend of the pine processionary moth. With her husband, Sir Thomas and his brother Sir Cecil, they gardened just over the French border at Ventimiglia at the famous La Mortola gardens. She had over 500 larval nests removed from her own arboretum which included Aleppo and Canary Island pines. But of the legend she says that larvae used to devour the crops on Cimiez hill (just outside Nice) and the local farmers sought the help of a very pious monk at the Monastery. The jolly friar attracted the caterpillars with a bell, book and candle. He cursed and excommunicated them and finally drove them across the valley of the Paillon to Grammondo. He also compelled them to change their diet, and to eat pine needles. From the monk the larvae retained the habit of walking in procession.

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BOOK REVIEW

Grasshoppers and Allied Insects of Great Britain and Ireland. Judith A. Marshall and E.C.M. Haes. Harley Books, 1988, 252 pages incl. 12 colour plates. £25.

A Sound Guide to the Grasshoppers and Allied Insects of Great Britain and Ireland. J. F. Burton and D. R. Ragge. Harley Books, 1988, cassette tape, 30 minutes. £5.75.

The trickle of fine entomological works from Harley Books is threatening to become a flood, with dragonflies in hot pursuit of spiders and caterpillars, and grasshoppers leaping along behind. It is rumoured that even the long-awaited volume on butterflies will appear shortly.

The present volume is a comprehensive treatment of the grasshoppers, crickets and bush-crickets of the order Orthoptera (or Saltatoria) in its narrow sense, together with stick-insects, cockroaches, mantids and earwigs, all formerly included within the Orthoptera.

All native species and established aliens are covered in depth. The Channel Islands are included, and contribute two additional species of grasshoppers. One chapter is devoted to discussing the exotic species that may be imported with plants or fruit, or escape from captivity, while four probable migrant species are also illustrated. Readers may be surprised to find stick-insects and mantids included in a book of British insects, but the praying mantis is represented by one specimen that may have migrated here, and the stick-insects by three species from New Zealand established in the West Country and the Scilly Isles, together with the familiar laboratory stick-insect, occasionally escaping but unable to establish itself permanently.

The book fills the gap left when D. R. Ragge's excellent *Grasshoppers, crickets and cockroaches* went out of print. The authors state that they have set out to update and supplement Ragge, and in this task they have succeeded magnificently. The last twenty-odd years of research and recording have been incorporated, and coverage is extended to include the earwigs. Study of these insects has been largely neglected owing to their very meagre representation in the British Isles, and it is good to see them here.

Some chapters are by specialist authors: J. F. Burton on recording the sounds of Orthoptera, and R. & C. Foord on their photography. Dr Ragge has contributed the interesting and lucid account of the distribution and history of the British Orthoptera from his earlier work, with slight alterations. A beginner to the group might have a problem here, since in this chapter the insects are referred to predominantly by their English names, but by their scientific names in the rest of the book. The problem is solved neatly by the provision of a bilingual bookmark that lists English and scientific names side by side. In any case the authors recommend that both sets of names be used, no difficult task in so small a group.

In the scientific names, a conservative classification is followed, and the few departures from the currently standard Continental works of Harz are argued carefully and logically. One of the English names has been changed — on Dr Ragge's